NEW SPECIES OF *CLUSIA* (CLUSIACEAE) FROM THE CORDILLERA OCCIDENTAL OF COLOMBIA

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ABSTRACT

Fieldwork conducted during a survey of Las Orquídeas National Park in Antioquia, Colombia, resulted in the discovery of two undescribed species of *Clusia* section *Anandrogyne*. *Clusia deminuta* Pipoly & Cogollo and *C. paisarum* Pipoly & Cogollo are described and illustrated, and their respective distributions, ecology, conservation status, etymology of epithets and phylogenetic relationships are elucidated.

RESUMEN

El trabajo de campo durante una investigación de la flora del Parque Nacional Natural "Las Orquídeas," ubicado en el Departamento de Antioquia, Colombia, dio como resultado el descubrimiento de dos especies nuevas, pertenecientes al género *Clusia* sección *Anandrogyne*. Se aportan descripciones, ilustraciones, comentarios sobre sus respectivas distribuciones geográficas, ecología y condiciones en cuanto a la conservación, así como la etimología de los epítetos específicos y el parentesco de *Clusia deminuta* Pipoly & Cogollo y de *C. paisarum* Pipoly & Cogollo.

The genus *Clusia* section *Anandrogyne* Planch. and Triana is now known to contain more than 70 species (Pipoly 1995, 1998) and is defined by the largely anantherous staminodes of the pistillate flowers and the pluriseriate, acropetally longer stamens of the staminate flowers, the latter with anthers dehiscent by wide longitudinal slits. While carrying out fieldwork to document the plant diversity of Las Orquídeas National Park, two new species were encountered and are described herewith.

Clusia (§**Anandrogyne**) **deminuta** Pipoly, sp. nov. (**Fig. 1**). TYPE. COLOMBIA. ANTIOQUIA: Mpio. Urrao; Corregimiento La Encarnación; Trail to Parque Nacional Natural "Las Orquídeas," first hill between Quebrada el Aguacate and Quebrada San

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José, 06° 27' N, 76° 13' W, 2,200–2,400 m, 8 Feb 1995 (fr), *J. Pipoly, J. Ramírez & J. Arias 18595* (HOLOTYPE: JAUM; ISOTYPES: BRIT, FMB).

Quoad paniculam 5-floridam, folia subsessiles vel sessilies, petiolos late marginatos sepala 4, petala 6, *C. popayanensi* valde arcte affinis sed ab ea ramulis tetragonis (non teretibus), laminis linearibus oblongis vel loratis (non ellipticis) ad apices acuminatis (nec rotundatis), pedicellis tetragonis 2.8–3.2 mm longis (non obsoletis), necnon habitu epiphytico (non terrestri) perfacile cognoscitur.

Epiphytic shrub to 3 m tall; latex white. *Branchlets* tetragonal, with the angles formed by small rounded ridges running from the side of each petiole base to the center of the petiole above it, 2.5–3 mm diam. between nodes, 3–4 mm diam. at the nodes; semisucculent, the bark smooth, shiny, exfoliating, glabrous. *Leaves* subsessile to very short petiolate; blades thinly coriaceous, linear, oblong or lorate, (5.2–)6.0–11.5 cm long, (1.2–)2.0–2.4 cm wide, apically acuminate, the acumen 4–8 mm long, basally broadly rounded, the midrib prominently raised above and below, the secondary veins numerous, perpendicular to the midrib, prominently raised above and below, the submarginal collecting vein perpendicular to the secondaries, prominently raised above and below, the tertiary veins not visible from above, prominulous below, glabrous and dull above, pallid below, the latex canals not obvious, bearing numerous rubiginous dots below, the margin revolute, decurrent on the petiole; petiole subobsolete to 4 mm long, deeply canaliculate and widely marginate throughout, glabrous, decurrent on either side of the stem and almost touching the petiole base of the opposite leaf. *Staminate inflorescence* and *flowers* unknown. *Pistillate inflorescence* terminal, dichasial, 5-flowered, with two basal lateral flowers followed by a rachis segment and 3 terminal flowers; peduncle tetragonal, 1.7–2.5 cm long, inflorescence bracts 2, qualitatively identical to foliage leaves but membranaceous, 15–17 mm long, 3–3.5 mm wide, midrib raised in a sunken furrow above, prominently raised below, the secondary venation not visible, the petioles obsolete to 2 mm long; upper peduncle tetragonal, 9–11 mm long; floral bracteoles 2, below the two basal, lateral flowers, stiffly coriaceous, widely ovate, 3–3.5 mm long, 2.4–2.6 mm wide, apex broadly rounded but with a small acuminate-mucronulate tip, ventrally (abaxially) keeled medially, the margin opaque, entire; pedicels of basal lateral flowers like the peduncle; upper bracteoles as in lower bracteoles but 3–3.2 mm long, 2.8–3 mm wide, terminal flower cluster pedicels as in peduncle except 2.8–3.1 mm long. *Pistillate flowers* with sepals 4, decussate, chartaceous, the outer suborbicular, cucullate 4–4.2 mm long, 3–3.2 mm wide, apically broadly rounded, the margin opaque, entire, inner sepals as in outer except margin irregularly notched; petals 6, contorted, membranaceous, obovate-sparhulate, as in sepals except constricted basally; staminodes 5, alternate with the carpels (opposite carpel suture), minute, anantherous, subulate, ca. 1 mm long,

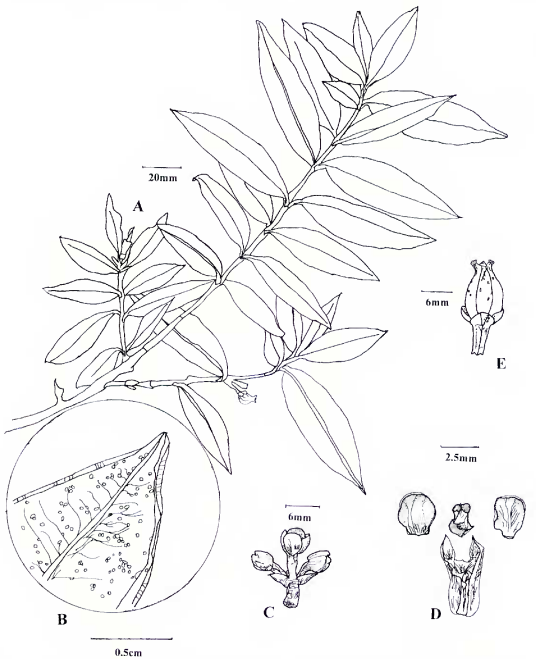

FIG. 1. *Clusia deminuta* Pipoly. A. Fruiting branchlet. B. Close up of abaxial leaf surface, showing revolute margin and rubiginous dots. C. Pistillate inflorescence in bud. D. Dissection, showing sepal (left), pistil (upper center), petal (right), and pedicel with floral bracteoles (lower center). E. Fruit. A–E, drawn from type.

0.3 mm wide, early caducous; pistil 5-carpellate, oblongoid, ca. 3 mm long, 1.3 mm diam., the styles obsolete, the stigmas 5, cuneiform, brick red, the surface appearing papillate. *Mature fruit* ovoid, 1.3–2 cm long, 0.8–1 cm

diam. when dried, sutures furrowed, the styles stout, ca. 1.5 mm long, the stigma concave, deltoid (triangular with rounded corners), the seeds small, numerous, with orange arils.

Distribution.—Apparently endemic to Parque Nacional "Las Orquídeas," in the Municipio of Urrao and the Corregimiento of La Encarnación, Department of Antioquia, Colombia, on the Cordillera Occidental of the Andes, growing from 1,300–2,400 m elevation.

Ecology and conservation status.—*Clusia deminuta* is a canopy epiphyte in the pluvial premontane, cloud and elfin forest, where it forms large individuals that often acquire a weight sufficient enough to break the branches of the host tree. In the premontane forest, it is restricted to the tops of emergent trees, whereas higher, in the cloud and elfin forest, it may be found in tangles of fallen vegetation. It requires nearly open light, so is very susceptible to the periodic, catastrophic "blowdowns" seen on radar imagery for the region, mostly attributable to seismic activity. Even though the species has a locally common distribution, I would still consider it threatened because the entire region is prone to frequent and violent seismic activity. It should be noted that the "elfin forests" inhabited by *Clusia deminuta* are some of a very few true elfin forests found on the South American continent, mostly because the mountains on which they occur are not high enough to permit existence of subpáramo and páramo formations.

Etymology.—The epithet "deminuta" refers to the small stature of the plant, its leaves, branchlets, flowers and fruit.

PARATYPES. **COLOMBIA. Antioquia:** Mpio. Urrao; Corregimiento La Encarnación; Parque Nacional Natural "Las Orquídeas," Sector Calles, Quebrada La Bironda, 06° 31' N, 76° 19' W, 1,300-1,500 m, 3 Apr 1992 (fr), *D. Cárdenas & E. Álvarez 3261* (FMB, JAUM, MO), Vereda Calles, right bank of Río Calles, on the mountain range NW of Cabaña Calles, 06° 32' N, 76° 19' W, 1,450 m, 1 Dec 1993 (fr), *A. Cogollo et al. 7637* (BRIT, FMB, JAUM); permanent premontane pluvial forest inventory plot, 06° 32' N, 76° 19' W, 1,450–1,500 m, 28 Nov 1993 (ster.), *J. Pipoly, A. Cogollo et al. 17292* (BRIT, FMB, JAUM); Zona limítrofe del Parque Nacional Natural "Las Orquídeas," Vereda Calles, 06° 32' N, 76° 19' W, 1,450–1,500 m, 30 Nov 1993 (pist. fl bud), *J. Pipoly et al. 17369* (BRIT, FMB, JAUM).

The cuneiform stigmas, appearing papillate, with 5 carpels and 5 very reduced, subulate staminodes without antheroles, clearly place *Clusia deminuta* within section *Anandrogyne* Planch. & Triana. Section *Anandrogyne* is by far the largest and the most complex within the genus, containing 75 species (Pipoly et al. 1995, 1998), including at least 21 as yet undescribed. The five-flowered panicle, subsessile or sessile leaves, widely marginate petioles (when these are developed), calyx of four sepals and corolla of six petals indicate that *Clusia deminuta* is most closely related to the vicariant *C. popayanensis* Planch. & Triana. *Clusia popayanensis* is a poorly known species, from the Chocó floristic region of western Cauca Department, growing in the subpáramo thicket life zone. *Clusia deminuta* is easily separated from *C. popayanensis* by

its tetragonal branchlets, linear, oblong or lorate leaf blades with acuminate apices, tetragonal pedicesl 2.8–3.2 mm long, and epiphytic habit.

Clusia deminuta is an important, locally common endemic from Las Orquídeas National Park. The elfin forest area at the Park's northern boundary is extensive and our exploration was very limited. Based on collections from the area, the northernmost areas of the Cordillera Occidental of Colombia is home to large numbers of undescribed, yet ecologically important and very conspicuous species of flowering plants.

Clusia (§Anandrogyne) paisarum Pipoly, sp. nov. (**Fig. 2**). Type. COLOMBIA. Antioquia: Mpio. Urrao; Corregimiento La Encarnación; Trail to Parque Nacional Natural "Las Orquídeas," first hill between Quebrada el Aguacate and Quebrada San José, 06° 27' N, 76° 13' W, 2,200–2,400 m, 8 Feb 1995 (fr), *J. Pipoly, J. Ramírez & J. Arias 18585* (holotype: JAUM; isotypes: BRIT, COL, FMB).

Propter inflorescentiam terminalem atque flores congestos, lamina coriaceaque elliptica vel oblonga, pedunculos quadratos, ovarium 7-carpellarum, denique fructus globosusque rostratus, *C. cassimoidi* valde arcte affinis, sed ab ea ramulis quadraris (non rerebrius), laminis acuminaris (non rotundatis), petiolis 1.1–2.2 (non usque ad 1.0) cm longis, necnon sepalis 5 (non 4), atque petalis 6(nec 5), statim separabilis.

Terrestrial *shrub* to 3 m tall; latex yellow. *Branchlets* tetragonal, the angles formed by acute angles running from each petiole base to the center of the petiole 90° from and above it, 4.5–5(–7) mm diam., not swollen at the nodes; semisucculent, the bark smooth, sordid, not exfoliating, glabrous. *Leaves* petiolate; blades coriaceous, elliptic to narrowly oblong or rarely lanceolate, (7.0–)11.5–15(–17) cm long, (3.2–)4–5.5(–6) cm wide, apically short acuminate, the acumen 5–10 mm long, basally acute, midrib raised but canaliculate above, the channel decurrent to petiole base, prominently raised below, the secondary veins 28–34 pairs, diverging at approxmately 45° from the midrib and arcuate, barely prominulous or inconspicuous above, prominulous below, the submarginal connecting vein barely prominulous above, prominulous below, the secondary veins alternating with shorter intersecondary veins that terminate before reaching the connecting vein, the tertiary veins inconspicuous, the latex canals numerous, linear, black, conspicuous below only on immature leaf blades, glabrous and dull above, pallid below, the margin entire, flat, decurrent on the petiole; petiole deeply canaliculate and marginate throughout, (1.1–)1.3–1.5(–2.2) cm long, glabrous. *Staminate inflorescence and flowers* unknown. *Pistillate inflorescence* terminal, a 6-flowered, congested cyme; peduncle tetragonal, (1.7–)4.0–5.5 cm long; inflorescence bracts 2, qualitatively identical to the vegetative leaves except blades (2.0–)3.0–8.5 cm long, (0.7–)1.2–3 cm wide, the petioles 0.5–1.0 cm long; upper peduncle tetragonal, 5–8 mm long; floral bracts 2, cartilaginous, ovate, 10–12 mm long, 6.5–7 mm wide, apically acute to attenuate, prominently keeled, medially strongly rugose, the margin stramineous, entire; floral bracteoles

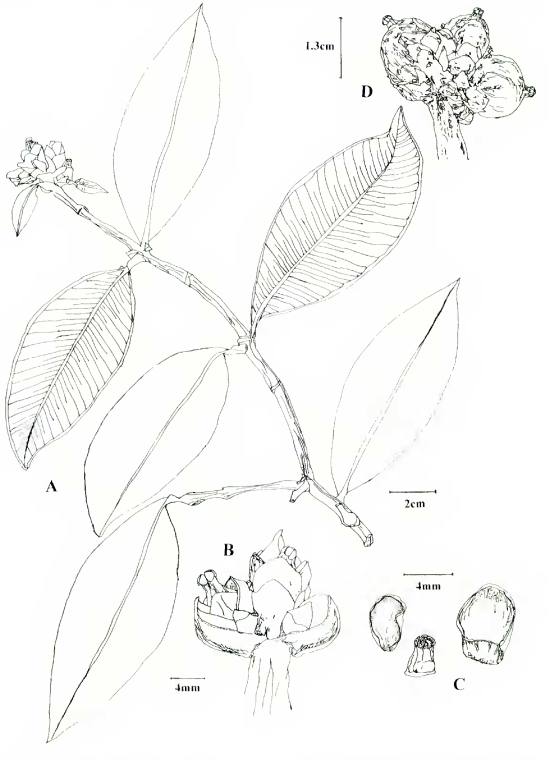

FIG. 2. *Clusia paisarum* Pipoly. A. Fruiting branchlet. B. Inflorescence, lateral view. C. Dissected pistillate flower bud, showing sepal (left), pistil (center) and petal (right). D. Infructescence. A–D, drawn from type.

2, as in floral bracts but widely ovate, 6.8–7.2 mm long, 5,8–6.2 mm wide, apically broadly rounded to an acute tip, prominently rugose medially, the margin stramineous, entire; pedicels obsolete. *Pistillate flowers*: sepals 5, the outer two opposite, the inner three contorted; outer sepals stiffly cartilaginous, suborbicular, 8.8–9.2 mm long, 10.1–10.5 mm wide, apically very broadly rounded, somewhat cucullate, medially somewhat rugose, the margin opaque, entire; inner sepals acropetally larger, chartaceous, stramineous, ovate, to 9.4 mm long, 7.3 mm wide, apex broadly rounded, the upper margin thin, translucent, irregularly incised; petals 6, coriaceous, contorted, oblong, 13–14.1 mm long, 6–7.5 mm wide, apically slightly cucullate, the margin opaque, entire; staminodes 7, alternate with the carpels, anantherous, connate into a small ring, oblate, 0.7 mm long, 1.3–1.5 mm wide, apically sharply acuminate; pistil 7-carpellate, obovoid, 9.8–10.2 mm long, the ovary ca. 7–7.3 mm long, 7.3–7.5 mm wide, the styles 2–3 mm long, the stigmas concave, black, cuneiform, 1.3–1.5 mm long, 1.2–1.4 mm wide, smooth. *Mature fruit* globose, 1.3–2 cm long and wide, the carpels 7, not obvious, without obvious suture lines, the styles thin, 2–3 mm long, giving a beaked (rostrate) appearance to the fruit, the stigmas as in the flowers, the seeds small, numerous.

Distribution.—Apparently endemic to the type area near Parque Nacional "Las Orquídeas," in the Municipio of Urrao and the Corregimiento of La Encarnación, Department of Antioquia, Colombia, along the western slopes of the Cordillera Occidental of the Andes, growing from 2,200–2,400 m elevation.

Ecology and conservation status.—*Clusia paisarum* is a terrestrial tree growing in remnant montane pluvial forest, near small watercourses. It is locally common along the margins of remnant forest, but particularly abundant on the ridges above roadcuts. It is also an important element of these remnants because it is deeply rooted and in fact, is often used to tie pack animals to as they rest along the paths. However, it does not attain a diameter over 10 cm DBH, and perhaps for that reason, and its copious, sticky yellow latex, it is rarely cut down. Despite significant effort, no staminate plants were found, but there were significant numbers of trees not in flower, some of which may have been staminate.

Etymology.—The specific epithet "paisarum" is derived from the local Spanish adjective "Paisa," a colloquialism for Colombians inhabiting the coffee-growing region comprised of the Departments of Antioquia, Risaralda, Caldas and Quindío. The region around Urrao, Antioquia is particularly noteworthy for its production of coffee and grenadilla, a species of *Passiflora*.

Paratype. **COLOMBIA. Antioquia:** Mpio. Urrao; Corregimiento La Encarnación; Trail to Parque Nacional Natural "Las Orquídeas," first hill between Quebrada el Aguacate and Quebrada San José, 06° 27' N, 76° 13' W, 2,200-2,400 m, 8 Feb 1995 (fr), *J. Pipoly, J. Ramírez & J. Arias 18580* (BRIT, COL, FMB, JAUM).

Clusia paisarum is most closely related to *C. cassinoides* Planch. & Triana, with which it shares of its yellow latex, terminal, congested inflorescence, coriaceous usually elliptic or oblong leaf blades, tetragonal peduncles, 7-carpellate ovaries and globose, beaked fruits. However, *Clusia paisarum* can immediately be separated from *C. cassinoides* by the tetragonal stems, short acuminate leaf apices, longer petioles, more numerous sepals and petals.

This species belongs to a group of species within the large *Clusia* section *Anandrogyne* with yellow latex. This group includes such problematic taxa as *Clusia stenophylla* Standl. and *C. longistyla* Cuatrec., the former found from Mesoamerica to the Darien of Panama, and the latter from the northern pluvial lowland forests of Antioquia and the Choco of Colombia, southward to Esmeraldas, Ecuador, an area still within the Choco Floristic Province. However, both *Clusia stenophylla* and *C. longistyla* have much larger oblong or elliptic leaf blades with broadly rounded apices and bases, pyramidal panicles, extremely long, alate petioles (3–8 cm long), 5-carpellate fruits and long, thin, persistent styles, clearly distinguishing them from both *Clusia paisarum* and *Clusia cassinoides*.

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